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ABSTRACT

This paper summarizes class size research conducted primarily since 1970. The paper discusses various relevant issues for use in policy, in schools, and in additional research. Several studies over the years have focused on: the issue of small being better and less being more and emphasized the STAR (Student Teacher Achievement Ratio) education experiment; controversy over use of the STAR findings; harmful and beneficial effects of small class size; costs of small class size; commonsense issues related to class size (i.e., teachers know that they can teach better in small classes, and parents get very involved in schools with small classes); teacher aide effects and class size research; class size and school safety; school-wide remedial projects and class size effects; and the federal policy debate about class size (which is shifting slightly toward smaller classes). (Contains 43 references.) (SM)

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SOME CONNECTIONS BETWEEN CLASS SIZE AND STUDENT SUCCESSES*

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The study lasted for four years and, in my opinion, is the most significant educational research done in the US during the past 25 years. (Orlich, 1991, p. 632).

> Wisdom is not communicable . . . Knowledge can be communicated, but not wisdom. One can find it, live it, be fortified by it, do wonders through it, but one cannot communicate and teach it." (Hesse, 1951 p. 144)

Introduction

This paper summarizes class-size research conducted primarily since 1970. Points are presented as thoughts for policy, for use in schools, and for added research. Modest speculation derived from combining the results of various studies is also advanced. The material communicates some of the knowledge derived about class size in early primary grades that has been collected over the years. The wisdom and the will to begin to redirect education policy and practice cannot be communicated. Educators, leaders and parents must generate the will to use what research shows will improve schooling. Collective wisdom mandates that investing in young people is not only long overdue, it is the duty of people of integrity. Small classes for little kids constitute education's IRA.

Small is Better; Less is More

Energized by the Glass and Smith (1978) and Smith and Glass (1979) meta-analyses and followed by some class-size interest and research in the United States and Canada from about 1978-1982, it's taken approximately 20 years for class size to be taken seriously as a major factor in education, and about 10 years for results of the STAR (Student Teacher Achievement Ratio) education experiment to have relatively wide-spread consideration in

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American education. The STAR experiment and carefully evaluated implementations of small classes have shown a "class-size effect" that includes a wide range of positive outcomes for students, teachers, parents, and eventually for society. The class-size change causes the new outcomes.

The STAR, Lasting Benefits Study (LBS), Challenge, and STAR Follow-up results have been made widely available in articles, research reports, conference papers, monographs, and ERIC entries. Eventually, STAR findings attracted some attention and received positive critical comments. STAR was a tightly controlled, longitudinal experiment of class size that corrected for many of the weaknesses identified in prior class-size studies. The LBS, Challenge and STAR Follow-up projects extended the STAR experimental work. After his year-long review of the STAR studies, Professor Emeritus Frederick Mosteller at Harvard commented that experimental studies like STAR should provide a basis for education policy and for changes in practice (1995).

> . . . the Tennessee class size project, . . . illustrates the kind and magnitude of research needed in the field of education to strengthen schools (p. 113). . . . it is important that both educators and policy makers have access to its statistical information and understand its implications. (p. 126).

By re-analyzing the K-3 STAR data, Princeton economist and education production-function researcher Professor Alan Krueger (1997, 1998) confirmed the original STAR K-3 findings and extended then in ways to help leaders make policy decisions. Krueger's analysis showed that positive outcomes could be obtained with only small differences in class sizes, in the range of 22-25 students, a class-size range of interest to persons considering large-scale changes such as in California. Krueger added his voice to Mosteller's that STAR was a well conceived and important study.

Professor Mosteller (1995) and Mosteller, Light, and Sachs (1996) argued that STAR and similar experiments should inform educational policy decisions. Krueger (1997) explained why people should rely heavily on STAR results compared to earlier class-size studies, [or studies of pupil-teacher ratio (PTR) mislabeled as class size studies]. Mixed results of some earlier studies can be explained by reviewing them in light of STAR findings .

> One well designed experiment should trump a phalanx of poorly controlled, imprecise, observational studies based on uncertain statistical specifications. (Krueger, 1997, p. 27).

There has been some federal interest in class-size adjustments, especially in America's poorest schools, but the President's 1998 proposed class-size initiative ran into roadblocks including: political ideology; criticism from some persons who mistake class size and pupil-teacher ratio (PTR), or who advocate other education changes; and the facilities crisis brought about from a) long-standing facilities neglect, b) increasing enrollments, and c) the move to smaller classes with the mindset that only classrooms in traditional school will do for small groups of very young students.

> "Now we must make our public elementary and secondary schools the best in the world ... and every parent already knows the key, good teachers and small classes. Tonight I propose the first-ever national effort to reduce class size in the early grades. . . . With these teachers, we will reduce class size in the first, second, and third grades to an average of 18 students in a class." (W. Clinton, *State of the Union Address*. 1/27/98; cited in the NY Times, 1/28/98, p. 19A.)

Some Contentiousness in Using Class-Size Results

Uses and proposed use of STAR findings have generated predictable controversy in the media and professional literature, and among researchers, politicians, and policy people. In truculent tones reminiscent of R. Callahan's (1967) Education and the Cult of Efficiency, some claim that there may be more efficient ways to improve student achievement or that it is expensive to reduce class size. This assault on longitudinal, replicable research is based on little but speculation -- Shakespeare might have said "sound and fury" -- and questionable logic. How can we understand the "efficiency" of reducing class sizes until there are enough small-class activities for the serious study of them? Most dire cost predications about the burden of small classes do not factor in cost savings, long-term benefits, or systemic changes that small classes precipitate. (See Table 1)

TABLE 1 ABOUT HERE

Class Size: Pervasive and Persuasive

Has any research shown harmful effects of small classes, or that larger classes are better for children? What successful education projects or interventions do not rely on a small-class effect? How much success of some popular projects might be attributed to a small-class effect if the evaluations took class size into account as a separate variable? Tutoring and cooperative learning are class-size efforts. Alternatives to regular public education thrive upon a small-class effect: Home schooling, alternative schools, charter schools, expensive private schools, apprenticeships.

The anti-class-size literature offers hypothetical discussions of how something else (we're not quite sure what that is) might be a better or less expensive way than small classes to get at the same achievement and behavior outcomes. The critics usually neglect student behaviors or affect. Favorite suggestions include spending the funds for technology, for incentives, for staff development, or for more projects.

We're just now beginning to understand the effects of early small-class education on later student behavior (e.g., Bain et al., 1997). The STAR Follow-up Studies show long-term education and social benefits, such as student drop-out, discipline actions, retention in grade, high school courses of study and grades achieved. These results are similar to the long-range outcomes of the Perry Preschool Project (Barnett, 1985, 1995; Weikert, 1989; 1998, etc.).

New policy analysis research might review the "trade-offs" in various class-size implementations, such as options involving space use; social cost/benefit questions associated with the high costs of retention, remediation, special education, student indiscipline, etc. Class-size issues might be connected to space usage (proxemics) and the possibility that crowding little children may contribute to later difficult behavior, such as gangs in schools, or that large classes produce stale air that adds to teacher fatigue and student inattentiveness late in the school day. How does early schooling in small classes extend recent findings of brain research, cognitive psychology, neuroscience, group dynamics and community? Small classes increase student participation in and identification with school (Finn, 1989, 1993, 1998). If this leads to a positive trajectory of success in school and the probability that students will not drop out, does this support Lindsay (1982, 1984) that school participation carries over into young adult participation in society?

Class Size and Costs/Teachers, Space, and "Out of the Box"

Some people explain that using small classes is expensive, that there is no space, and that there are no teachers available to teach the new small classes. These are problems, but they are not insurmountable. Consider some actual situations.

Operating at the same per-pupil expenditure as the rest of the district, The Downtown School in Winston-Salem, NC has classes of about 14:1. In Success Starts Small (SSS) two schools in the same system had 24:1 and 14:1 because of re-allocation and use of Title I funding. The use of small classes does not have to be costly, especially if one factors in the benefits of small classes. Examples of these benefits are in Table 1.

Schools currently have educators who are not teaching "regular" classes, and these teachers are part of the PTR and class-size differences. Reallocation of personnel and teaching spaces will help solve the space and personnel problems. Table 2 includes an example of how such re-allocation of personnel may be decided in site-based decisions. (This is an adaptation of the form and process used in one NC school.) Classes in Burke County, NC have been reduced in grades 1-3 at little added expenses per pupil.

Tables 3 and 4 provide summaries of actual school-initiated efforts to reduce class sizes to below 20:1 and to so this without adding much funding to the schools over that amount already used there. If these schools can get small classes by careful use of resources, it should be possible for other to do the same.

Finally, because small classes are particularly useful when a student enters school in K or grade 1, the use of small classes should begin in grades K and/or 1, and be added one grade at a time. This process will give leaders time to plan, evaluate early results, and make adjustments as needed during a 3-4 year implementation process.

TABLES 2, 3, and 4 ABOUT HERE

What are the implications of small classes for use of space, time, and technology in schooling? For improved school-home relationships? For innovative use of personnel?

As more answers become available about small classes in education, information about the efficiency of small class size should also become available. The STAR-generated class-size research has answered the question about the effectiveness of early small-class interventions. How efficient is it to continue educational conditions (e.g., large classes) that lead to school dropout, grade retention, or "achievement gaps?"

Bloom (1984 a & b) asked educators to seek answers to his "2-sigma problem" and "search for methods of group instruction as effective as one-to-one tutoring." How can educators approximate those learning outcomes in a group setting? Appropriate-sized classes in K-3 are a start. They offer three

socially-desirable benefits that are expressed American values. Those benefits of Quality, Equality, and Equity provide measurable positive outcomes and one mnemonic for education improvement: Better Education = QE^3.

- Quality. Many indicators, including higher achievement in academics, behavior, citizenship, and development show the quality of small classes.
- Equality. All participants get the same treatment. No group gets more or less than another. Each student gets the same-sized scoop of ice cream.
- Equity. Minority and hard-to-teach youngsters benefit more from small classes than do other youngsters, but all who benefit in a small class benefit in positive ways. (Achilles, Finn, & Bain, 1997-98; Finn & Achilles, 1990; Robinson, 1990; Wenglinsky, 1997, etc.).

Improved Education = QE^3: Small classes offer Quality, Equality, Equity

Class-size Research Squares with Common Sense

One beauty of class-size research is that for once education research results parallel common sense. Teachers know that they can teach better in small classes. Parents consistently ask that their youngsters be put into smaller classes and the parents get really involved at the school when the classes are small. (So parent-involvement problems are ameliorated). Most education projects rely on small classes numbers of youngsters with a single teacher, so small classes for all children provide overall school improvement. Often-espoused but seldom-employed "individualized" instruction actually becomes possible when a teacher has a manageable number of youngsters, and the teacher can realistically be held accountable for student achievement.

The class-size research raises many questions about early schooling. Besides the PTR-class size difference, educators may need to consider space vs. classrooms, remote or satellite primary-grade centers connected by technology to a home-base school, or re-deployment of some educators. Small classes raise issues of space and crowding, and subsequent student behaviors. Small classes intersect with school size as an important variable. [Small classes mitigate the negative outcomes of big schools. Nye, K. (1991)].

In addition to the stand-alone benefits of small classes, class size and the Effective School Correlates fit well together, and this validating mutual support is reassuring. If the Effective Schools Correlates make sense and have helped improve schooling, it should not be a surprise to find close connections between them and class-size elements.

Teacher Aides: A Policy Conundrum

The research emphasis on class size has overshadowed the teacher aide question that has not yet been fully examined. STAR's in-school experimental design could as easily make STAR an experimental study of teacher-aide effects as a study of class-size effects. Zaharias and Bain, two STAR researchers, compiled Teacher Aides and Student Learning, Lessons from Project STAR (1998) for Educational Research Service. Of the three STAR conditions, the Small class (S) was best, generally followed by the Regular class (R) and then by the Regular class with a full-time instructional aide. (RA). This experimental finding may help explain mixed results obtained in Prime Time where a teacher aide could be used to change the student-to-adult ratio in lieu of establishing a second class. (Chase, Mueller, & Walden, 1986; Tillitski et al., 1988). STAR was not the first study to show that aides did not help student outcomes (e.g., Davidson, Beckett & Peddicord, 1994). Achilles et al. (1993) questioned the sub-par performance of the teacher-aide classes in STAR.

Macro-level evidence on teacher-aide effects is contained in the generally poor results obtained by Title I over the years (LeTendre, 1991; Borman & D'Agostino, 1996; Wong & Meyer, 1998). Much of Hanushek's (1998) analysis of the "effects of class size" is an analysis of pupil-teacher ratio (PTR) effects (Tables 3-6, pp. 16-24 are even labeled PTR while proclaiming to provide evidence on class size), and this could include teacher aides, depending on how data are reported. He concluded that class size (sic) [or PTR (really)] has little effect on student outcomes. Besides Prime Time, the Nevada class-size initiative is getting mixed results, where because of space limits, one class-size treatment is two teachers in a class of 30-35 students. The inevitable conclusion from all these results is that class sizes, not teacher aides, influence student outcomes.

The teacher-aide findings present serious policy problems. Many teachers like and rely on teacher aides. Teacher aides often live in the immediate school community and know the community and the people there; the teachers may commute. As demography and education practice change, teacher aides may be important in assisting a teacher with inclusion—the placement of special-needs students in the regular classroom rather than in resource rooms or self-contained settings. Teacher aides may be indispensable in helping with bilingual or English as a Second Language (ESL) and Limited English Proficiency (LEP) students and in helping teachers understand the cultures of students from the community. The efficient and effective use of teacher aides is an area begging for more solid research.

Class Size and Safety

School safety has been illuminated in the harsh glare of some shocking violence, and also vastly overstated. Federal legislation and funding have followed the national goal of achieving safe and drug-free schools. Class size and school size are administratively mutable variables.

Class-size research shows that outcomes associated with small classes (and with small schools) are the foundations of safe schools: improved student behavior and human relations skills; increased participation in schooling and school-sanctioned events; and increased sense of community and family in small classes; and a generally imp[roved school climate where teachers, students, and parents feel less stress than in larger classes and larger schools. Smallness promotes familiarity with and knowledge of individuals that can head off violence before it happens. Although much research connects the use of small classes and schools to positive student behavior, much remains to be done here. The analogy, however, of the use of small classes in successful alternative schools for difficult youth is a powerful guideline.

School-Wide Remedial Projects

Given a class-size effect and the competing costs remedial projects such as the popular and useful Success for All (SFA), serious analyses should be done to determine what portion of projects can be attributed simply to their use of small classes to get their gains. If projects provide little benefit for their costs over and above what could be gained by school-wide class-size reduction, projects should be held to strict cost-benefit analyses. Perhaps the school-wide initiative should be small classes and projects should target the small number of especially difficult students who need even more direct individual attention than small classes allow. Most remedial projects used in schools today are sold at substantial prices.

Unfortunately, some projects that rely on class-size effects to get their positive results also drive the project-mentality, "pull-out" or "add-on" approach to education. To the extent that these projects use both pull-out and teacher-aide treatments, the class-size effect may have extra hurdles to leap! The class-size research helps address the Miles and Darling-Hammond (1998) concern that "very little research addresses how schools might organize teaching resources more effectively at the school level." (p. 9).

Use RESEARCH! Class Size, Not PTR, Should be a Policy Base

Policy decisions and evaluations of education outcomes need to be made separately for class size and for PTR. Mingling class size and PTR

causes confusion, blunts the positive impact of class size and hides shortcomings associated with PTR.

Hanushek (1998) stated the class size and PTR confusion succinctly: "The discussion until now has focused on pupil-teacher ratios, but pupil-teacher ratios are not the same as class sizes" (p. 12). The hesitation to use small classes and the tortuous approach to understanding the power of small classes have been driven by uncritical acceptance and substitution of PTR results as class-size outcomes over time.

"Class-size reduction" suggests that some rational, research-based class size is in general use. What is the research base upon which present class sizes are built? The current class size research is providing a serious look at what class sizes might be needed to meet the challenges of the changing contexts and demographics of education's clients.

Federal Policy Trends: Small Classes are Good Policy and Good Politics

The federal policy debate about class size may be shifting slightly toward smaller classes. In a 1988 report, Class Size and Public Policy: Politics and Panaceas, the federal policy position was summarized by Tomlinson as:

> Evidence to date . . . does not generally support a policy of limiting class size in order to raise student achievement or to improve the quality of work-life for teachers; nor does it justify small reductions in pupil/teacher ratios or class size on order to enhance student achievement. Research also fails to support school policies designed to lower class size if these do not first specify which pupils will benefit and how and why they will do so. (p. 37) (Note the class-size PTR confusion. CMA).

By 1997, the U.S. Department of Education's report, Building Knowledge for a Nation of Learners included the statement that "studies . . . such as reducing class size in the primary grades, have proved to help children get a good start in school" (p. 29). Reducing Class Size: What Do We Know (Pritchard, 1998) included the statement:

> Reducing class size to below 20 students leads to higher student achievement. However, class-size reduction represents a considerable commitment of funds, and its implementation can have a sizable impact on the availability of qualified teachers. . . . There is more than one way to implement class-size reduction, and more than one way to teach in a smaller class. Depending on how its done, the benefits of class-size reduction will be larger of smaller. (p. 14)

In a 1998 U. S. Department of Education-commissioned report, Class Size and Students At Risk: What is Known? What is Next? (Finn, 1998) concluded that "A clear small-class advantage was found for inner-city, urban, suburban and rural schools; for males and females; and for white and minority students alike" (p. 13), and that there is lots of room for added research to address many lingering issues and questions.

The shift in emphasis on class size by the U. S. Department of Education reflects political agendas of the times. The amount of federal funding for education is minor when compared to local and state support, so efforts to get small classes for young children need to target state and local policy makers more than federal officials. Federal education funding is primarily categorical, directed to specific groups or for narrow purposes. Funding for class-size reduction is general or across-the-board so that all students would benefit. Another approach to using small classes that makes sense when funds are limited would be to target class-size reductions to schools or even to classes that have high densities of students whom smaller classes have been shown to help more. Wenglinsky, (1997) said:

> In other words, fourth graders in smaller-than-average classes are about a half a year ahead of fourth graders in larger-than-average classes (p. 24) . . . The largest effects seem to be for poor students in high-cost areas. (p. 25).

If we've not had really serious discussions on class size issues and implications before, at least let's get serious about a research-driven base for major policy shifts in American education. We have knowledge about one scientifically-validated way to improve early schooling for children. Small K-3 classes offer Quality, Equality, and Equity. How to do what research shows should be done is a fair question for enlightened policy discussions, political decisions, educational leadership and new education studies. These positive steps will require a collective national wisdom and a better way. Time is wasting.

> Here is Edward Bear, coming downstairs now, bump, bump, bump, on the back of his head, behind Christopher Robin. It is, as far as he knows, the only way of coming downstairs, but sometimes he feels that there really is another way, if only he could stop bumping for a moment and think of it. And then he feels that perhaps there isn't. (p. 1)
>
> A. A. Milne, *Winnie The Pooh.*

Table 1. Checkpoints for True Costs of Reasonable-Sized (e.g. 18:1 or so) Classes in Primary Grades. (Achilles & Price, 1999. Adapted from School Business Affairs.)

Item	Potential for Cost Saving
A. Grade Retention	A. • Number of students held back decreases • Later drop-out rate decreases
B. Improved Student Behavior in School	B. • Vandalism costs decrease • Required corrective actions, such as Saturday school or detention decrease • Classroom disruptions decrease
C. Remediation and Special Projects	C. • Fewer expensive special projects required • Concentrate on fewer students intensely for shorter duration
D. Early ID of Learning Problems	D. • Special education programs reduced in later years • Programs accurately "targeted" to most needy students • Note possibility of increased costs in K and 1
E. Teacher Morale	E. • Increased attendance • Reduced substitute costs • Reduced "Burn out"
F. Creative Space Use	F. • Transportation-related costs • Flexibility and "found" space • Partnerships with business
G. Community, Parent Involvement, Volunteers	G. • Small classes attract parents and volunteers • Field trips (etc.) are less congested

Table 2. Worksheet: Conversion of Current Staffing Into Options for Class-Size Examples are in ( ). *

Current Staff Allocations		Positions (n) Actual	Desired
I. Regular Classroom Teachers		(19)	
II. Teacher Aides (Est. 2 per teacher for conversion)		4= (2)	
III. Specialty Persons (e.g.):			
A. Media/Library	A.	(1)	
B. Guidance	B.	(1)	
C. Administration	C.	(1)	
D. Specialists (e.g.):	D.		
1. Language(s)	1.		
2. Phys. Ed.	2.	(.5)	
3. Music/Art	3.	(.5)	
4. Technology	4.	(1)	
5. Etc.	5.		
E. Title I, Etc.	E.	(2)	
F. Exceptional Children	F.		
1. Gifted	1.	(.5)	
2. LD	2.	(.5)	
G. Other (Nurse, Coordinator)	G.	(2)	
H. Total Specialty Personnel	H.	(12)	
Total Positions Available for Consideration: (19 + 12)		(31)	
IV. Total Enrollment for Consideration:		(511)	
V. Lowest Class size for Consideration (511 ÷ 31):		(16.5)	
VI. Negotiated Target to Achieve		(20:1)	

*Adapted from Steve Hansel, Principal, Draper Elementary School, Rockingham County, NC

Table 3. Demographic Information about Schools Where Small Classes (18:1 or so) Have Been Implemented at Little Extra Costs.

		DEMOGRAPHIC INFO (Estimates)		
School	N	GRADES	Free Lunch	Minority
I. Monaview (SC)	600	pre K - 5	77%	45%
II. Downtown (NC)				
III. Oak Hill (NC)	380	K-5	78%	53%
IV. Hillcrest (NC)				
V. B. Hoffman (MI)	270	K-5	4%	25%

Table 4. Processes Used At Selected Schools to Get Small Classes With Little or No Funds Beyond What is Already Available.

	CLASS SIZES/GRADES, (n) (1997 - 1998) or PRE				CLASS SIZES/GRADES, (n) (1997 - 1998) or POST				How Achieve "Small"
School	K (n)	1 (n)	2 (n)	3 (n)	K (n)	1 (n)	2 (n)	3 (n)	
I. Monaview (SC)	26 (3)	20 (5)	16	21	14(6)	14 (6)	21	21	• Re-allocate Title I
II. Downtown (NC)	14	14	14	14	14	14	14	14	• STAFFING: Same per-pupil expense as rest of district • Title I
Set up at 1:14, but no more per-pupil funding than district average									
III. Oak Hill (NC)	33(1)	28(2)	29(2)	26(2)	14(2)	13-14(2)	14	24	• Use Title I. Matched with other school using PTR in SSS study.
IV. Hillcrest (NC)									
V. B. Hoffman (MI)	27(2)	27(2)	27(2)	27(2)	(see below *) AVE=22				• Special Ed

* The small school size and limited number of teachers encourage other changes than just class size: Looping and muti-age classes. By assigning the special education teachers to "classes," the "After" was (instead of 27:1): K(2) half day: AM/PM at n=20; 1-2 (4) with n=88; 2-3 (2) with n=44; 3-4 (2) with n=39; 4-5 (1) with n=20; 3-4-5 (1) with n=20 (12 teachers for 270 pupils, or about 22:1.

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Achilles, C .M. (1996) *Summary of Recent Class-Size Research with an Emphasis on Tennessee's Project STAR and its Derivative Research Studies.* Nashville, TN: Tennessee State University. Center of Excellence for Research on Basic Skills. 56 pages. This summary primarily emphasizes Project STAR and the series of class-size studies closely connected to STAR or studies conducted by STAR-related personnel. The author raises selected social and political considerations and possible research topics to increase the understanding of class-size outcomes. The publication includes an extensive bibliography.

Boyd-Zaharias, J., & Pate-Bain, H. (1998). *Teacher Aides and Student Learnings: Lessons from Project STAR.* Arlington, VA: Education Research Service (ERS). 31 pages. This "Relevant Research for School Decisions" document explains general STAR findings and specific outcomes of STAR's second experimental condition, the use of a full-time instructional aide. Zaharias and Bain conclude that STAR results did not support the use of full-time aides to increase student achievement.

Egelson, P., Harman, P., & Achilles, C. M. (1996). *Does Class Size Make a Difference?* Greensboro, NC: SouthEastern Regional Vision for Education (SERVE), Regional Education Laboratory. 40 pages. The Regional Laboratory report of recent class-size interest in North Carolina warns readers to make careful distinctions between class size and pupil-teacher-ratio (PTR). The report contains highly readable summaries of state-level class-size initiatives and emphasizes the positive outcomes of locally-supported class size reduction in Burke County in grades 1-3.

Finn, J. D. (1998, April) *Class Size and Students at Risk: What is Known? What is Next?* Washington, DC: US Department of Education, OERI (AR 98-7104). 38 pages. This easily read and carefully presented review of class-size studies includes priorities for added research and questions why the persistent class-size effect may exist. The document summarizes research on Academic Effects of Small Class Size, Assessing Costs and Benefits of Smaller Classes, and Instructional Practice and Student Behavior. The report emphasizes Project STAR.

Krueger, A. B. (1998, March) *Reassessing the view that American schools are broken.* FRBNY Economic Policy Review, 29-43. Using production-function and economic analyses, Krueger analyzes school outputs such as test-score change over time. A major portion reports on a re-anafysis of STAR outcomes that shows continuing growth over time and a class-size effect within the control group.

Molnar, A. (1998). *Smaller Classes, not Vouchers, Increase Student Achievement.* Harrisburg, PA: Keystone Research Center. 48 pages. In this clearly written report, Molnar contrasts the Milwaukee Parental Choice Voucher Program with Wisconsin's Student Achievement Guarantee in Education (SAGE) outcomes and shows how SAGE results "track" with STAR and STAR-related studies.

Mosteller, F. (1995 Summer/Fall). "The Tennessee Study of class size in the early school grades." *The Future of Children: Critical Issues for Children and Youths.* 5 (2), 113-127. Mosteller's clear and cogent review brought the STAR Project to public attention and energized the recent class-size debates. Mosteller critically analyzes the strengths and weaknesses of STAR, discusses the effect sizes of the results, and puts class size into perspective as education policy. Highly recommended.

Mosteller, F., Light, R. J. & Sachs, J. A. (1996, Winter). *Sustained inquiry in education: Lessons from skill grouping and class size.* Harvard Educational Review, 66 (4), 797-827. Three scholars analyze two long-term topics of education concern that also have extensive research legacies. They identify the good studies, major themes, and the outcomes that deserve consideration in education policy and planning. The section on class size provides analyses of STAR and STAR-related studies.

Pate-Bain, H., Boyd-Zaharias, J., Cain V., Word, E. & Binkley, M. E. (1997, September). *STAR Follow-up Studies, 1996-1997.* Lebanon, TN: HEROS, Inc. Based on a limited sample of grade 11 students who had been in STAR in grades K-3, the authors identify long-term results that seem related to small-class early schooling. Some benefits include higher grades in high school, fewer retentions and dropouts, selection of college-preparatory courses such as calculus and foreign language, and fewer suspensions from school. This pilot study showed ways to locate students and conduct follow-up studies using the STAR database.